MOUNTAINS

BUILDING

MULTIPLE PATHS

10
COMMUNICATION
DEVICE

WIRELESS CONDITION,
SERVICE QUALITY

10

11
MEASUREMENT-PERIOD
HOLDING UNIT

12
CHANGE
RECOGNITION
UNIT

13
MEASUREMENT-PERIOD
ACQUISITION UNIT

14
DELAY-PROFILE
MEASUREMENT UNIT

FIG. 1

Ds TRANSMISSION DATA		0		1		1
C0 SPREADING CODE	01101	01101		01101		01101
		⇩ SPREADING				
Dr WIRELESS DATA	01101	10010		10010		10010
	A↲					
D1 RECEIVED DATA	01101	10010		10010		10010
C0 SPREADING CODE	01101	01101		01101		01101
		⇩ DESPREADING				
D2 DESPREAD DATA	00000	11111		11111		11111
D3 REPRODUCED DATA		0		1		1

STATION

RECEIVER

FIG. 2

STATION B2

STATION B1

$\begin{pmatrix} \text{TRANSMISSION} \\ \text{DATA SERIES} \\ \text{Ds1, Ds2, Ds3} \\ \text{SPREADING CODE} \\ \text{C1, C2, C3} \end{pmatrix}$

$\begin{pmatrix} \text{TRANSMISSION} \\ \text{DATA SERIES} \\ \text{ds1, ds2, ds3} \\ \text{SPREADING CODE} \\ \text{c1, c2, c3} \end{pmatrix}$

RECEIVER ∼100

T0 MEASUREMENT PERIOD

| MEASUREMENT WITH 1ST SPREADING CODE | MEASUREMENT WITH 2ND SPREADING CODE | | MEASUREMENT WITH 1ST SPREADING CODE | MEASUREMENT WITH 2ND SPREADING CODE |

t0a | t0b | ts0

MEASUREMENT TIME | PAUSE TIME

FIG. 3

FIG. 4

~11a-1

NUMBER OF SPREADING CODE	1-10	11-20	21-48
MEASUREMENT PERIOD	50ms	100ms	200ms

FIG. 5

STATE BEFORE INCREASE OR DECREASE
IN NUMBER OF SPREADING CODES

| 1ST SPREADING CODE | 2ND SPREADING CODE | ---- | nTH SPREADING CODE | | 1ST SPREADING CODE | 2ND SPREADING CODE | --- |

$t1$ $t1$ $t1$ $ts1$

MEASUREMENT TIME

PAUSE TIME

$T1$ MEASUREMENT PERIOD

NUMBER OF SPREADING CODES=16

$n=16$
$t1=4ms$
$T1=100ms$
$ts1=36ms$
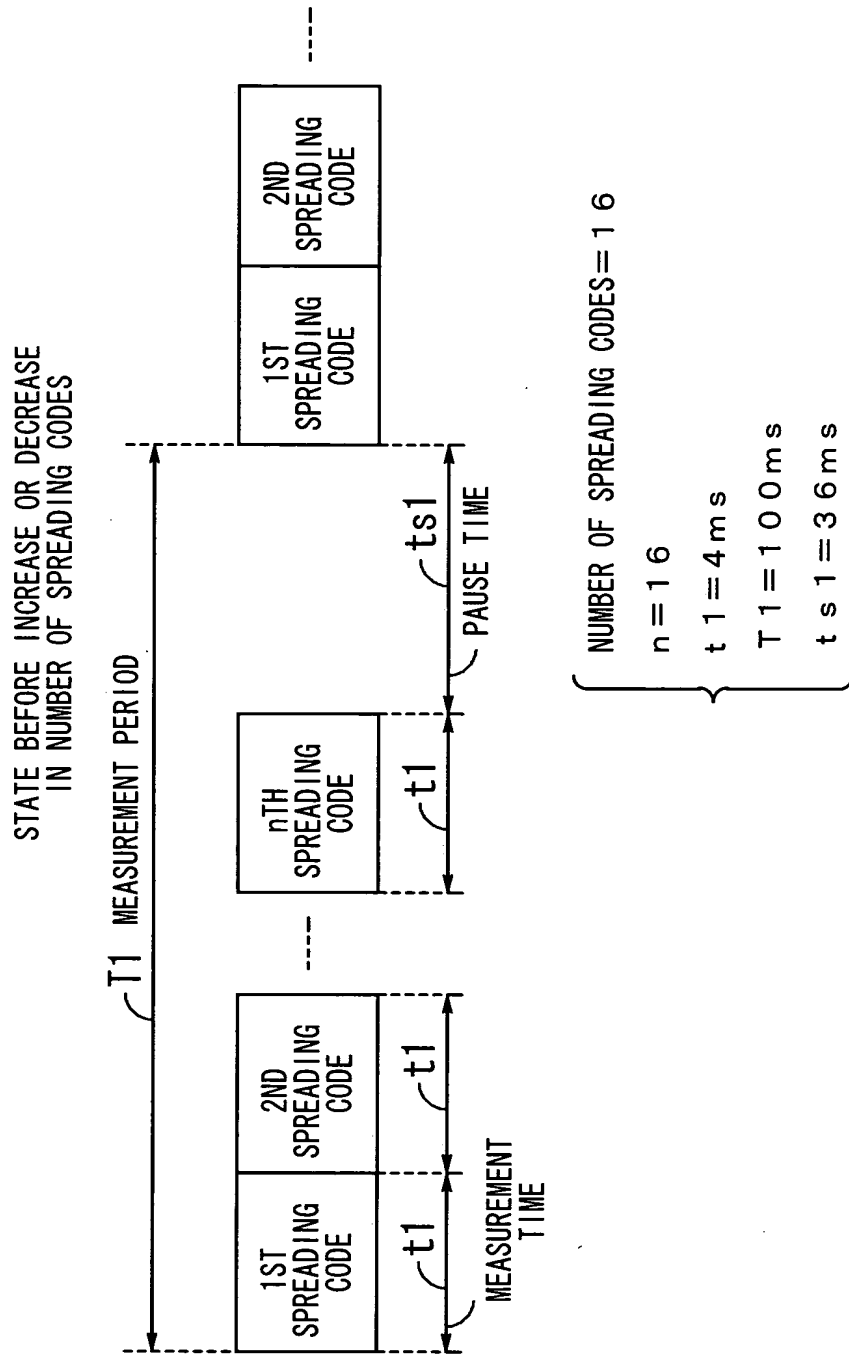
FIG. 6

STATE IN WHICH NUMBER OF SPREADING CODES IS INCREASED,
AND MEASUREMENT PERIOD IS NOT CHANGED
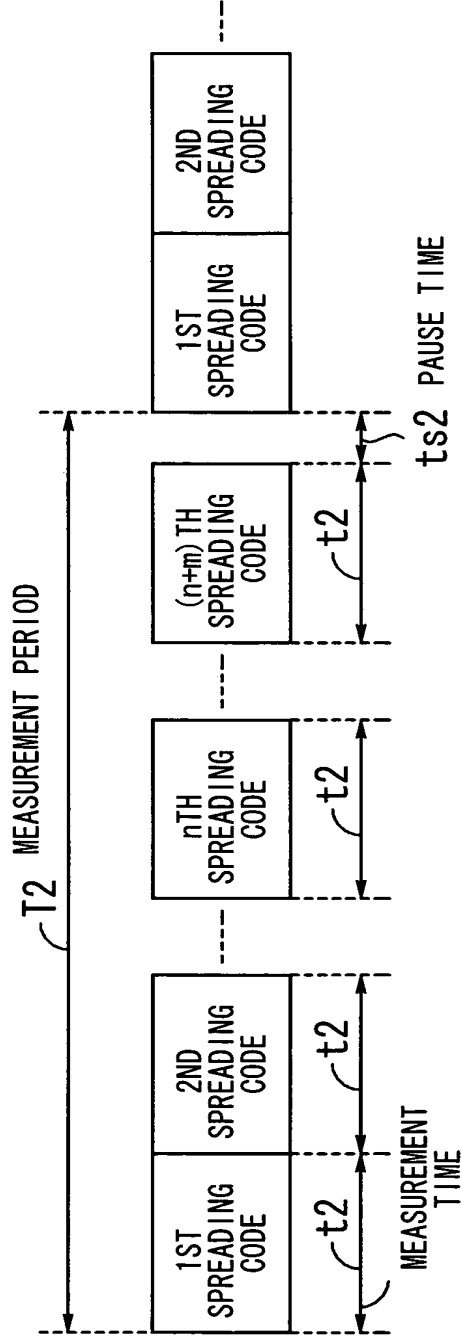
NUMBER OF SPREADING CODES＝２０

n＝１６

m＝４

t２＝４ｍｓ

T２＝１００ｍｓ

ｔｓ２＝２０ｍｓ

FIG. 7

STATE IN WHICH NUMBER OF SPREADING CODES IS INCREASED,
AND MEASUREMENT PERIOD IS CHANGED
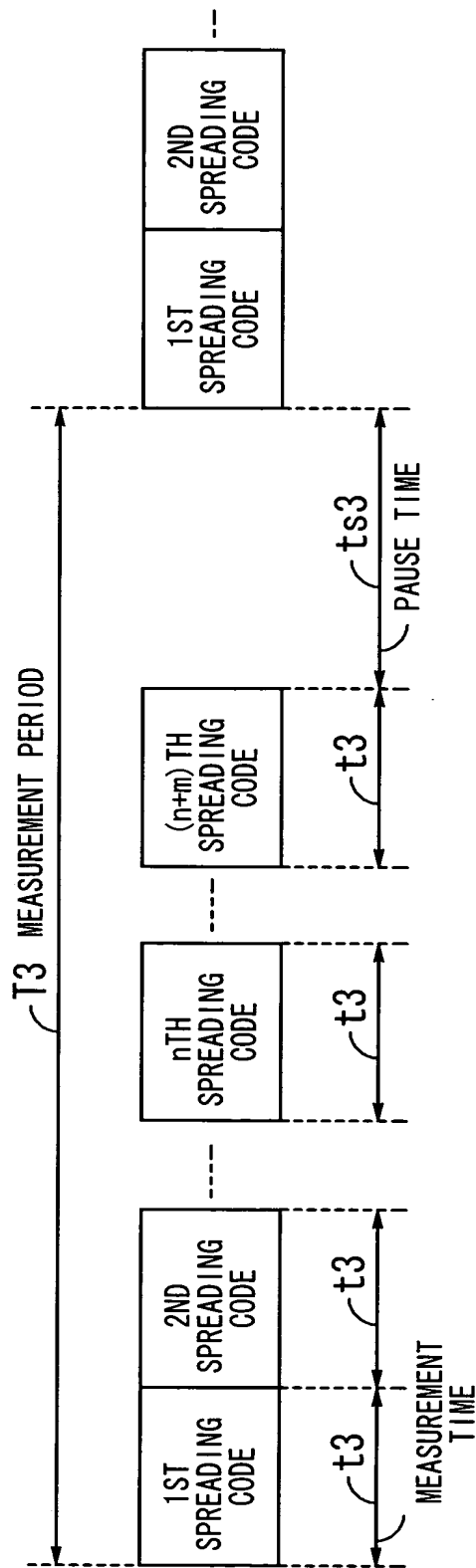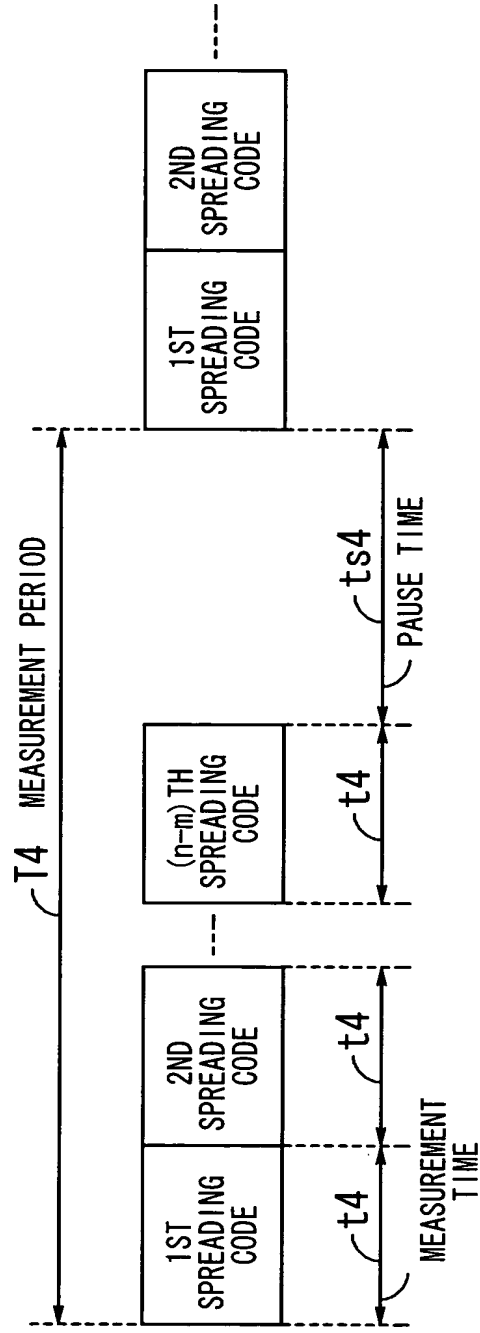

FIG. 8

NUMBER OF SPREADING CODES=30

n=16

m=14

t3=4ms

T3=200ms

ts3=80ms

STATE IN WHICH NUMBER OF SPREADING CODES IS DECREASED, AND MEASUREMENT PERIOD IS NOT CHANGED

$T4$ MEASUREMENT PERIOD

| 1ST SPREADING CODE | 2ND SPREADING CODE | --- | $(n-m)$TH SPREADING CODE | | 1ST SPREADING CODE | 2ND SPREADING CODE |

$t4$ MEASUREMENT TIME

$t4$

$t4$

$ts4$ PAUSE TIME

NUMBER OF SPREADING CODES = 12

$n = 16$

$m = 4$

$t4 = 4ms$

$T4 = 100ms$

$ts4 = 52ms$

FIG. 9

STATE IN WHICH NUMBER OF SPREADING CODES IS DECREASED,
AND MEASUREMENT PERIOD IS CHANGED

1ST SPREADING CODE	2ND SPREADING CODE	---	(n-m) TH SPREADING CODE		1ST SPREADING CODE	2ND SPREADING CODE

T5 MEASUREMENT PERIOD

t5   t5   t5   ts5

MEASUREMENT TIME   PAUSE TIME

NUMBER OF SPREADING CODES = 8

n = 16
m = 8
t5 = 4ms
T5 = 50ms
ts5 = 18ms

FIG. 10

COMMUNICATION DEVICE

10b

CHANGE RECOGNITION UNIT 12b

12b-1 SPREADING-CODE DETERMINATION UNIT

12b-2 MEASUREMENT-TIME DETERMINATION UNIT

SPREAD SIGNAL

RECEPTION CONDITIONS

EXAMPLE OF UPDATE UNIT

11b MEASUREMENT-PERIOD HOLDING UNIT

S11

S14

13b MEASUREMENT-PERIOD ACQUISITION UNIT

S13

S12

S15

DELAY-PROFILE MEASUREMENT UNIT 14b

14b-1 DELAY-PROFILE -MEASUREMENT CONTROL UNIT

EXPIRATION

14b-2 TIMER

S17

NOTIFICATION OF COMPLETION OF MEASUREMENT

S16, S19

14b-3 DELAY-PROFILE -MEASUREMENT EXECUTION UNIT

S18

RECEIVED SPREAD SIGNAL

MEASUREMENT RESULT
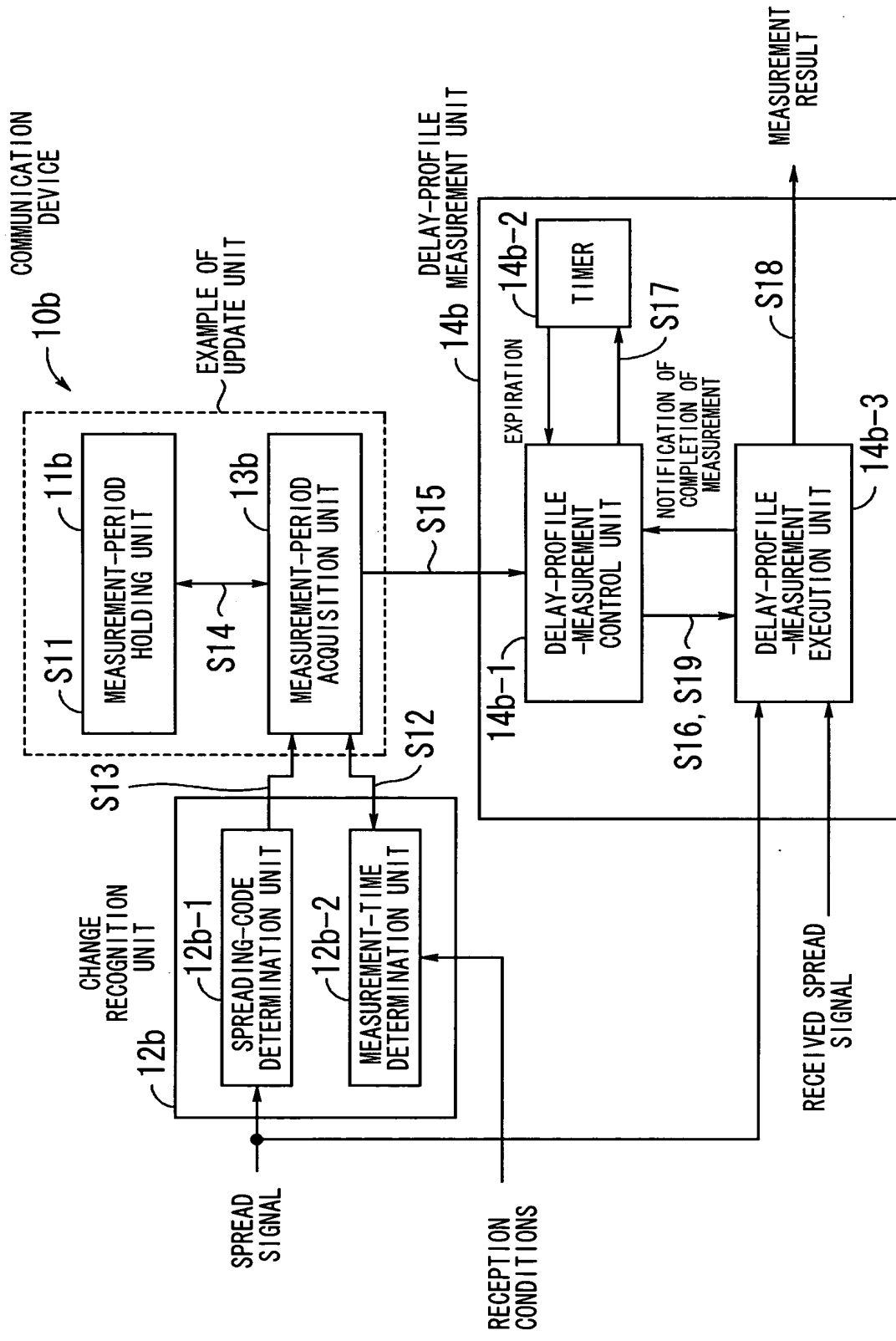
FIG. 11

11b-1

MEASUREMENT TIME	～1ms	～2ms	～4ms
MEASUREMENT PERIOD	50ms	100ms	200ms

FIG. 12
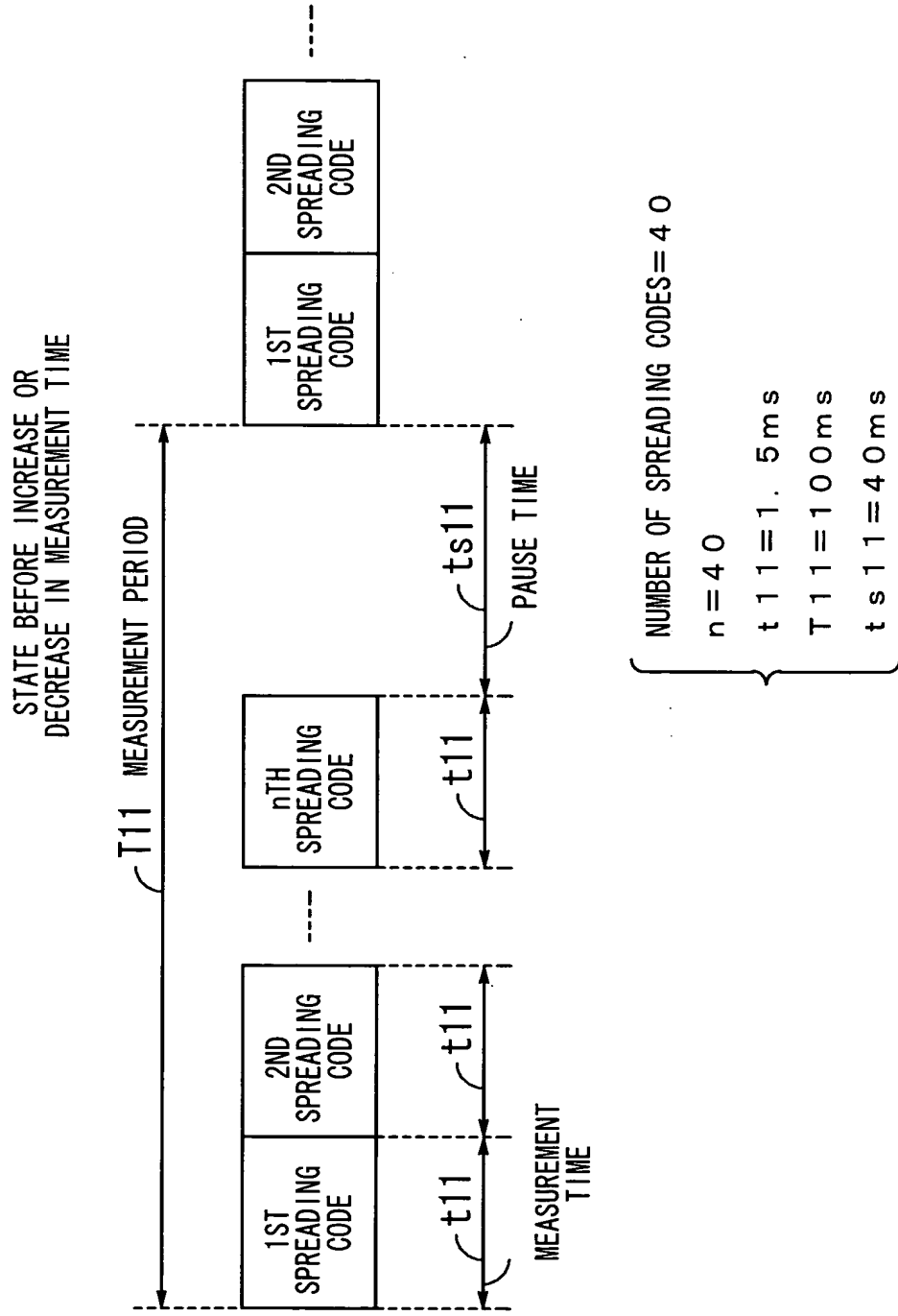
STATE BEFORE INCREASE OR
DECREASE IN MEASUREMENT TIME

T11 MEASUREMENT PERIOD

| 1ST SPREADING CODE | 2ND SPREADING CODE | ---- | nTH SPREADING CODE | | 1ST SPREADING CODE | 2ND SPREADING CODE | ---- |

t11 t11   t11   ts11

MEASUREMENT
TIME   PAUSE TIME

NUMBER OF SPREADING CODES＝４０

n＝４０
t１１＝１．５ｍｓ
Ｔ１１＝１００ｍｓ
ｔｓ１１＝４０ｍｓ

FIG. 13

STATE IN WHICH MEASUREMENT TIME IS INCREASED,
AND MEASUREMENT PERIOD IS NOT CHANGED

T12 MEASUREMENT PERIOD

1ST SPREADING CODE

2ND SPREADING CODE

nTH SPREADING CODE

1ST SPREADING CODE

2ND SPREADING CODE

t12

t12

t12

ts12 PAUSE TIME
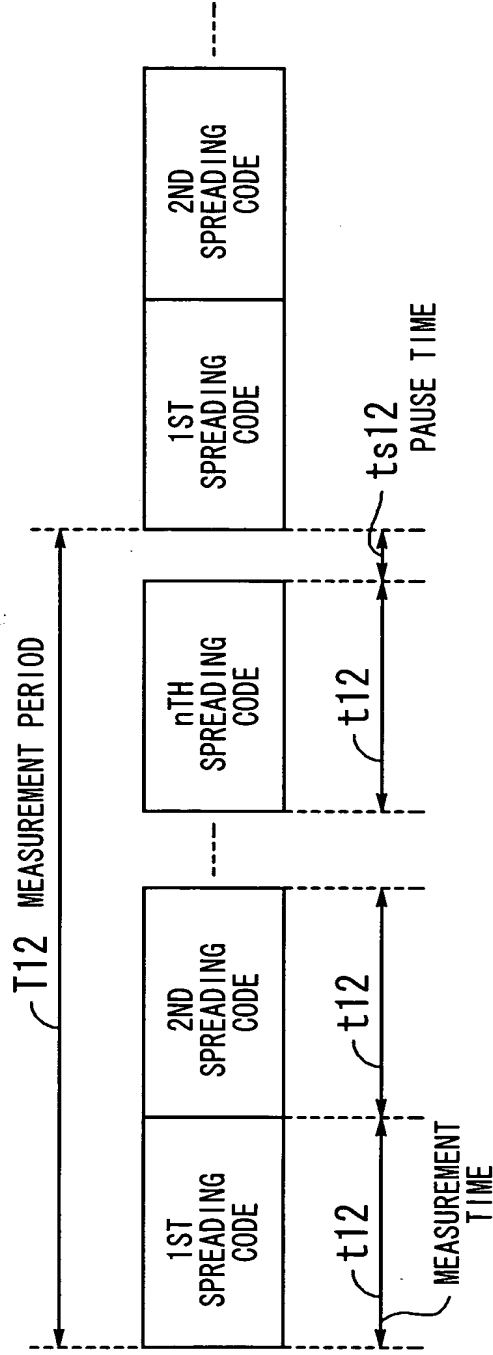
MEASUREMENT TIME

NUMBER OF SPREADING CODES=4 0

n=4 0

t12=2ms

T12=100ms

ts12=20ms

FIG. 14

STATE IN WHICH MEASUREMENT TIME IS INCREASED,
AND MEASUREMENT PERIOD IS CHANGED

| 1ST SPREADING CODE | 2ND SPREADING CODE | | nTH SPREADING CODE | | 1ST SPREADING CODE | 2ND SPREADING CODE |

T13 MEASUREMENT PERIOD

t13   t13   t13   ts13

MEASUREMENT TIME

PAUSE TIME
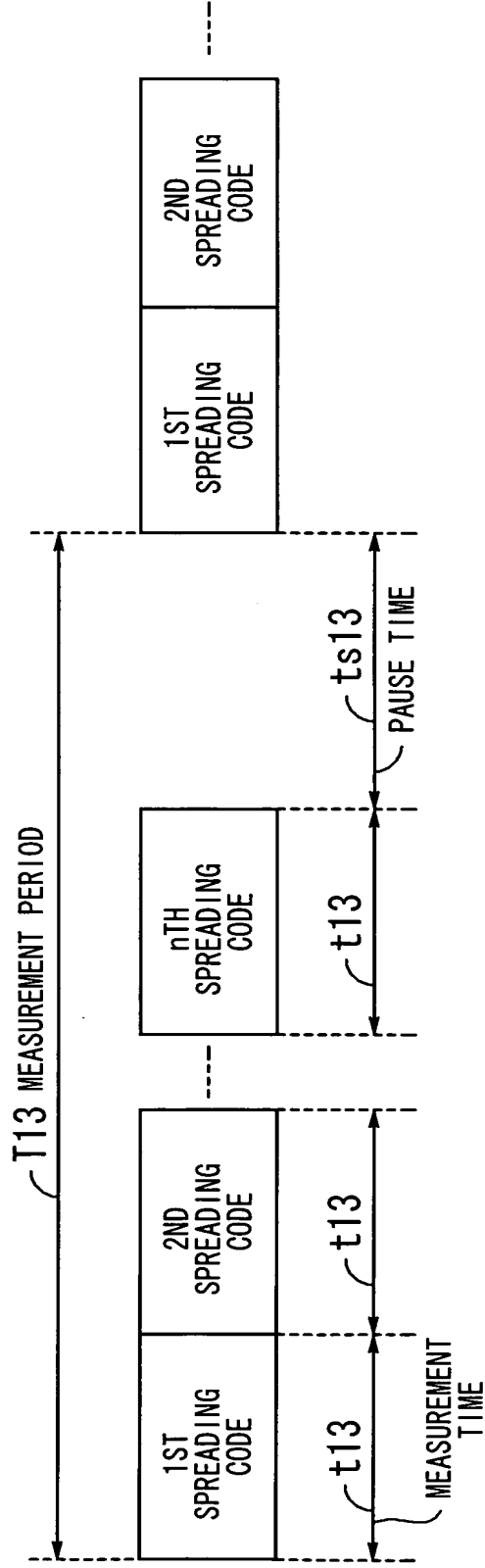
NUMBER OF SPREADING CODES = 4 0

$n = 4 0$

$t13 = 3 ms$

$T13 = 2 0 0 ms$

$ts13 = 8 0 ms$

FIG. 15

STATE IN WHICH MEASUREMENT TIME IS DECREASED,
AND MEASUREMENT PERIOD IS NOT CHANGED

T14 MEASUREMENT PERIOD

| 1ST SPREADING CODE | 2ND SPREADING CODE | ... | nTH SPREADING CODE | | 1ST SPREADING CODE | 2ND SPREADING CODE |

t14

t14

MEASUREMENT TIME

t14

ts14

PAUSE TIME

NUMBER OF SPREADING CODES= 4 0

n = 4 0

t 1 4 = 1 . 2 m s

T 1 4 = 1 0 0 m s

t s 1 4 = 5 2 m s

FIG. 16

STATE IN WHICH MEASUREMENT TIME IS DECREASED,
AND MEASUREMENT PERIOD IS CHANGED

1ST SPREADING CODE	2ND SPREADING CODE		nTH SPREADING CODE		1ST SPREADING CODE	2ND SPREADING CODE

T15 MEASUREMENT PERIOD

$t15$ $t15$ $t15$ $ts15$

MEASUREMENT TIME   PAUSE TIME

NUMBER OF SPREADING CODES = 4 0

$n = 4 0$

$t15 = 0.5ms$

$T15 = 50ms$

$ts15 = 30ms$

FIG. 17
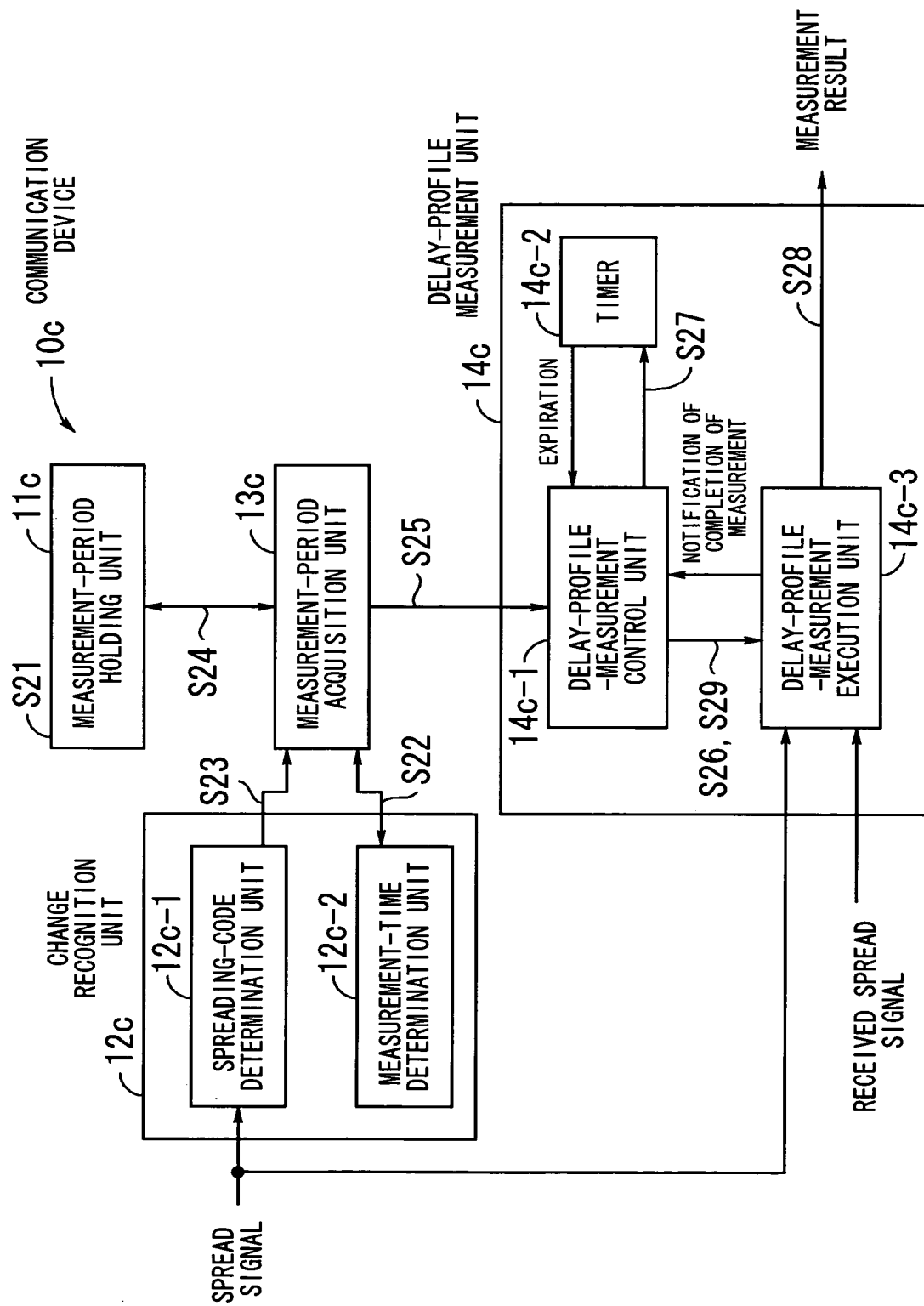
FIG. 18

11c-1

MEASUREMENT TIME \ NUMBER OF SPREADING CODE	1-16	17-32	33-48
~1ms	50ms	50ms	50ms
~2ms	50ms	100ms	100ms
~4ms	100ms	200ms	200ms

MEASUREMENT PERIOD

FIG. 19
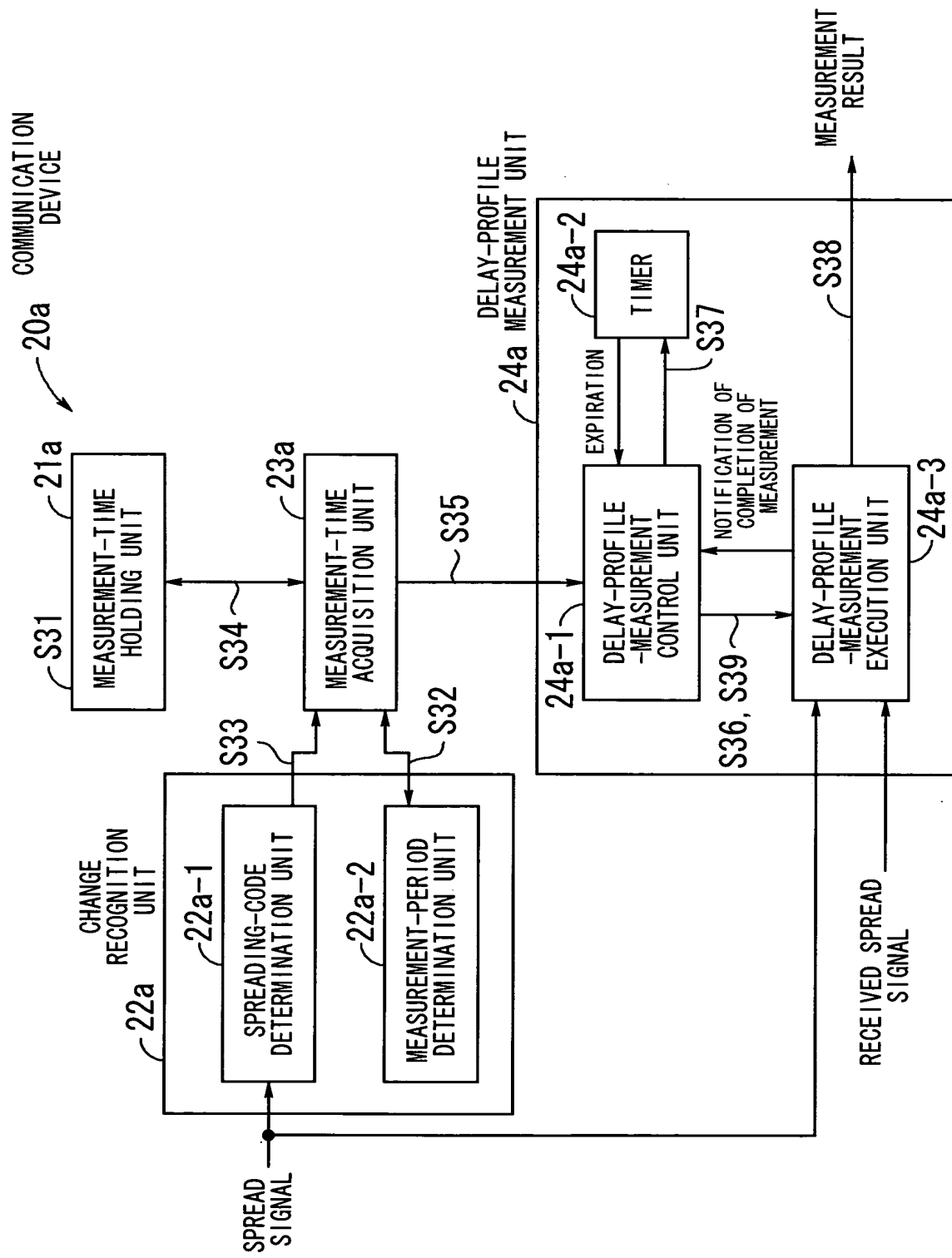
FIG. 20

21a-1

NUMBER OF SPREADING CODE	1-10	11-20	21-48
MEASUREMENT TIME	4ms	2ms	1ms

FIG. 21

STATE BEFORE INCREASE OR DECREASE
IN NUMBER OF SPREADING CODES
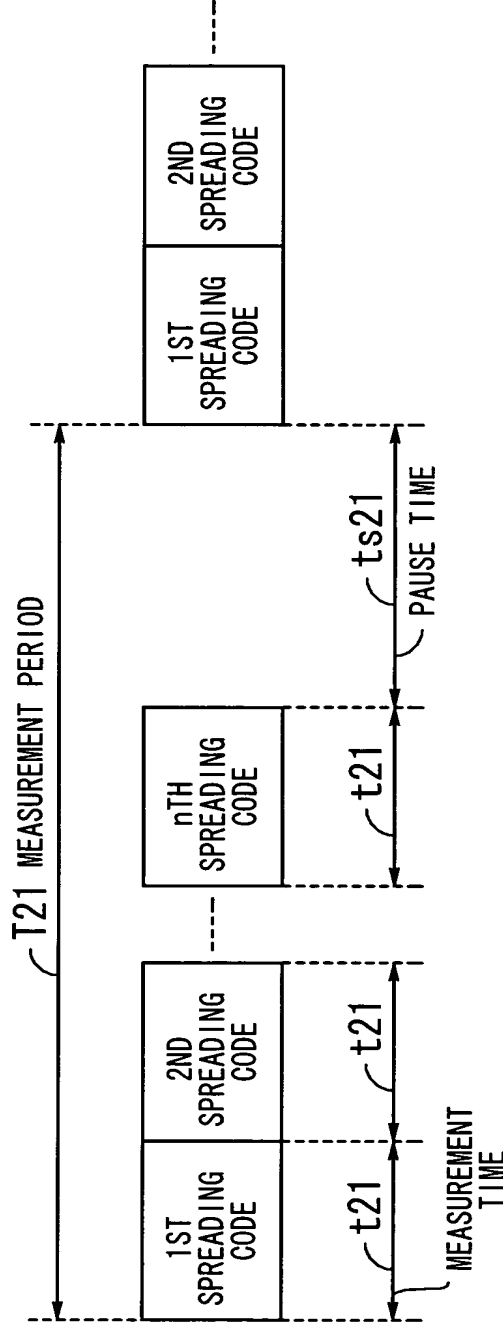
NUMBER OF SPREADING CODES＝１６

n＝１６

t２１＝２ｍｓ

T２１＝５０ｍｓ

ｔｓ２１＝１８ｍｓ

FIG. 22

STATE IN WHICH NUMBER OF SPREADING CODES IS INCREASED,
AND MEASUREMENT TIME IS NOT CHANGED

T22 MEASUREMENT PERIOD

| 1ST SPREADING CODE | 2ND SPREADING CODE | nTH SPREADING CODE | (n+m)TH SPREADING CODE | 1ST SPREADING CODE | 2ND SPREADING CODE |

t22   t22 ---- t22   t22   ts22

MEASUREMENT TIME

PAUSE TIME
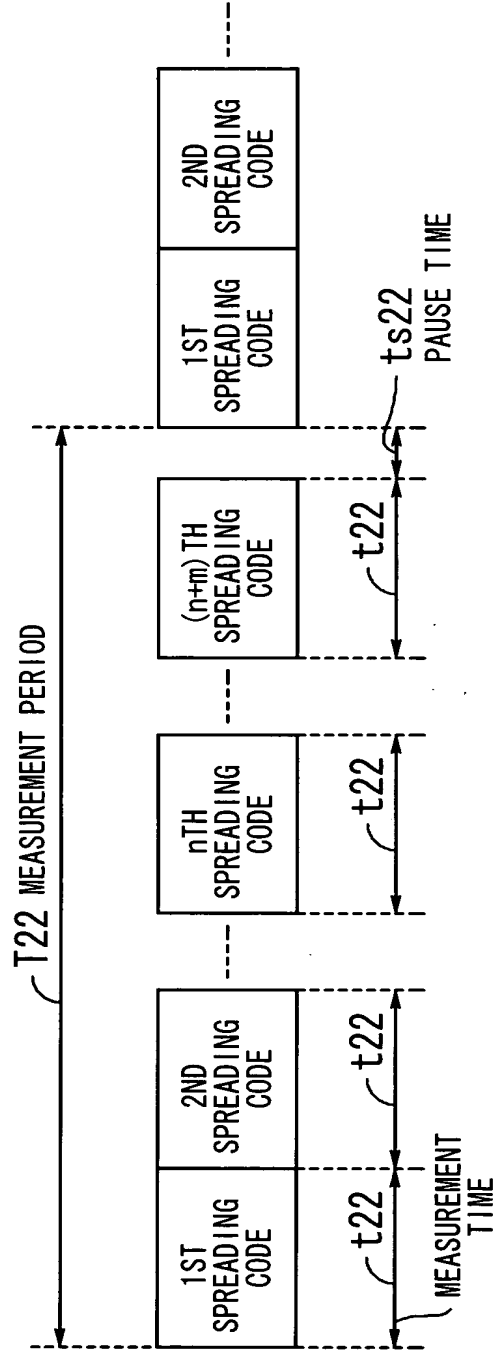
NUMBER OF SPREADING CODES=20

n=16
m=4
t22=2ms
T22=50ms
ts22=10ms

FIG. 23

STATE IN WHICH NUMBER OF SPREADING CODES IS INCREASED,
AND MEASUREMENT TIME IS CHANGED

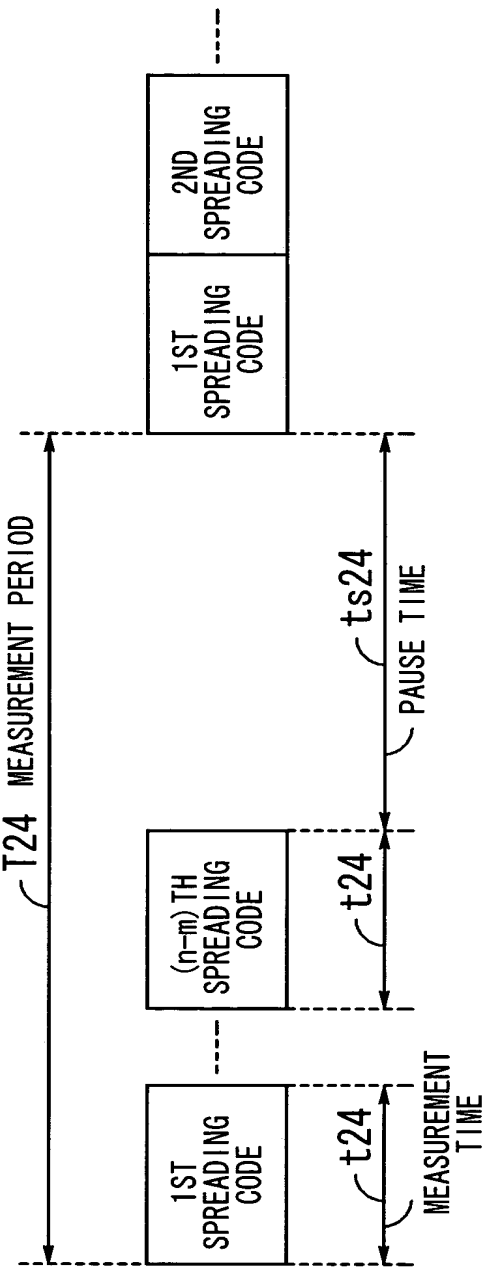| 1ST SPREADING CODE | 2ND SPREADING CODE | ---- | nTH SPREADING CODE | ---- | (n+m)TH SPREADING CODE | | 1ST SPREADING CODE | 2ND SPREADING CODE | ---- |

T23 MEASUREMENT PERIOD

t23 · t23 · t23 · t23 · ts23

MEASUREMENT TIME · PAUSE TIME
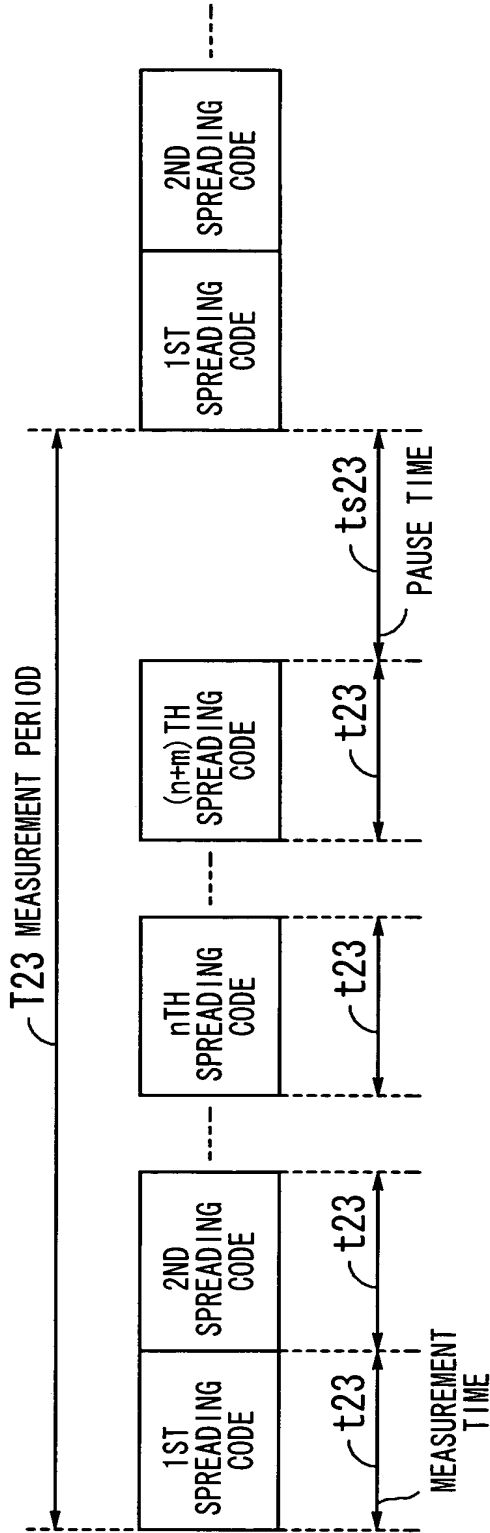
NUMBER OF SPREADING CODES = 3 0

n = 1 6
m = 1 4
t 2 3 = 1 m s
T 2 3 = 5 0 m s
t s 2 3 = 2 0 m s

FIG. 24

STATE IN WHICH NUMBER OF SPREADING CODES IS DECREASED,
AND MEASUREMENT TIME IS NOT CHANGED
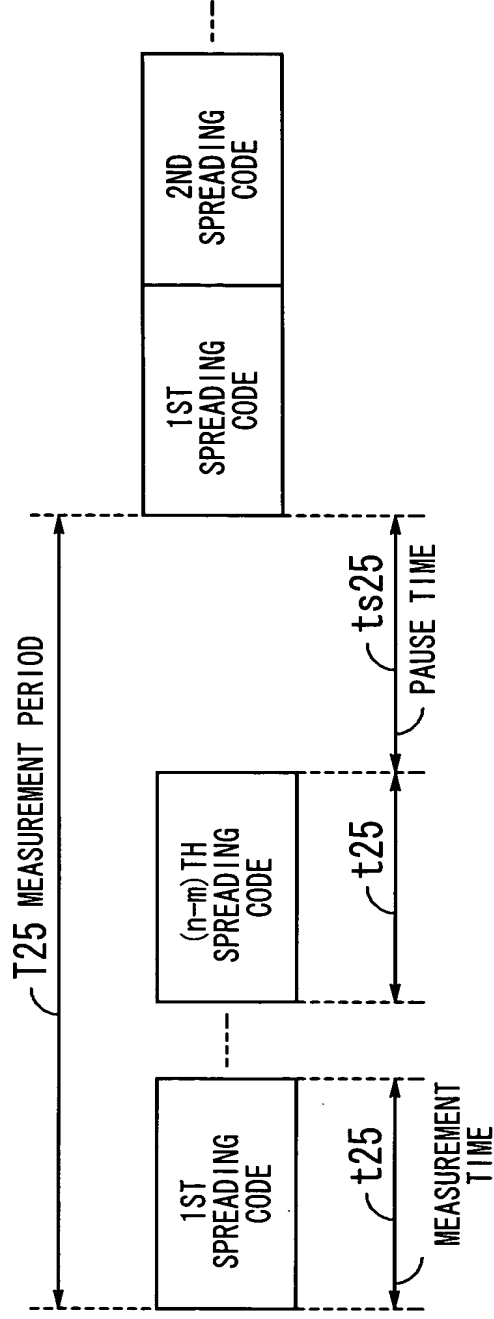

NUMBER OF SPREADING CODES = 1 2

n = 1 6

m = 4

t 2 4 = 2 m s

T 2 4 = 5 0 m s

t s 2 4 = 2 6 m s

FIG. 25

STATE IN WHICH NUMBER OF SPREADING CODES IS DECREASED,
AND MEASUREMENT TIME IS CHANGED

|←———————————— T25 MEASUREMENT PERIOD ————————————→|

| 1ST SPREADING CODE | --- | (n-m)TH SPREADING CODE | | 1ST SPREADING CODE | 2ND SPREADING CODE | --- |

|← t25 →|
MEASUREMENT TIME

|← t25 →|←— ts25 —→|
         PAUSE TIME

NUMBER OF SPREADING CODES = 8

n = 1 6

m = 8

t 2 5 = 4 m s

T 2 5 = 5 0 m s

t s 2 5 = 1 8 m s

FIG. 26
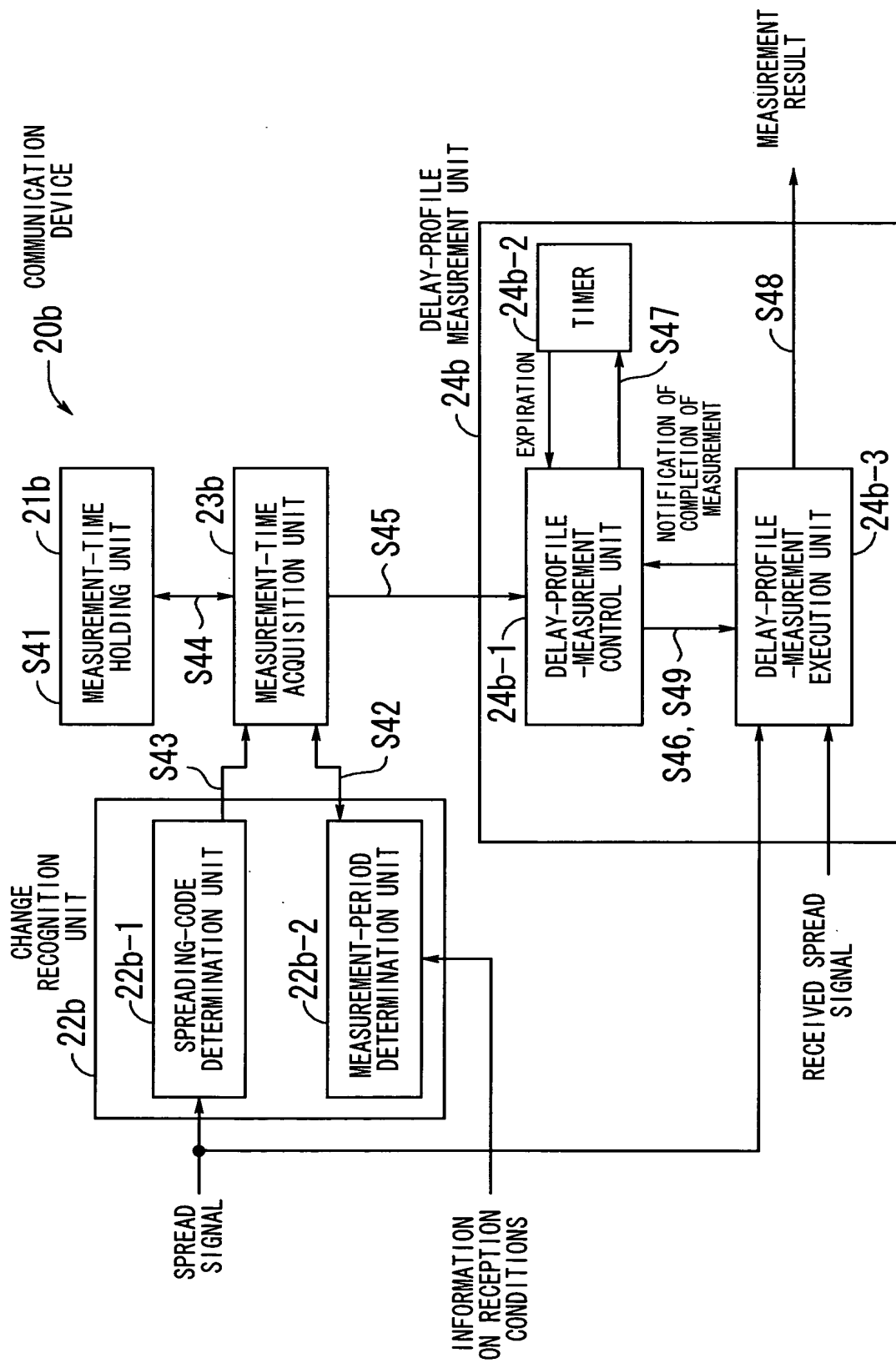
FIG. 27

— 21b-1

MEASUREMENT PERIOD	5 0 m s ～	1 0 0 m s ～	2 0 0 ～ 4 0 0 m s
MEASUREMENT TIME	1 m s	2 m s	4 m s

FIG. 28

STATE BEFORE INCREASE OR DECREASE
IN MEASUREMENT PERIOD

T31 MEASUREMENT PERIOD

| 1ST SPREADING CODE | 2ND SPREADING CODE | nTH SPREADING CODE | 1ST SPREADING CODE | 2ND SPREADING CODE |

t31 — MEASUREMENT TIME

t31

t31

ts31 — PAUSE TIME
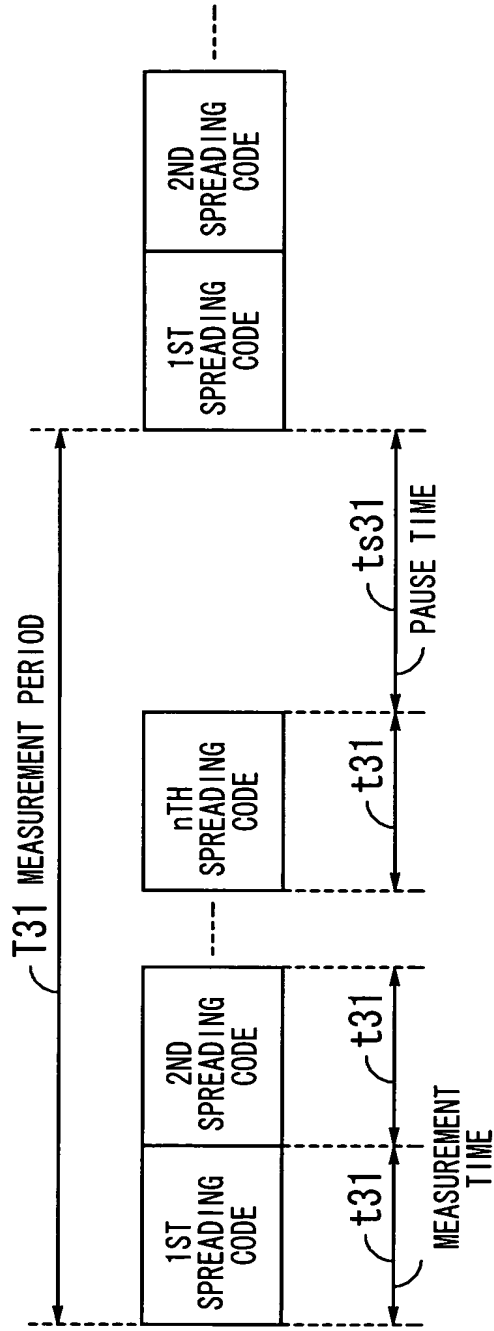
NUMBER OF SPREADING CODES = 4 0

n = 4 0

t 3 1 = 2 m s

T 3 1 = 1 5 0 m s

t s 3 1 = 7 0 m s

FIG. 29

STATE IN WHICH MEASUREMENT PERIOD IS INCREASED,
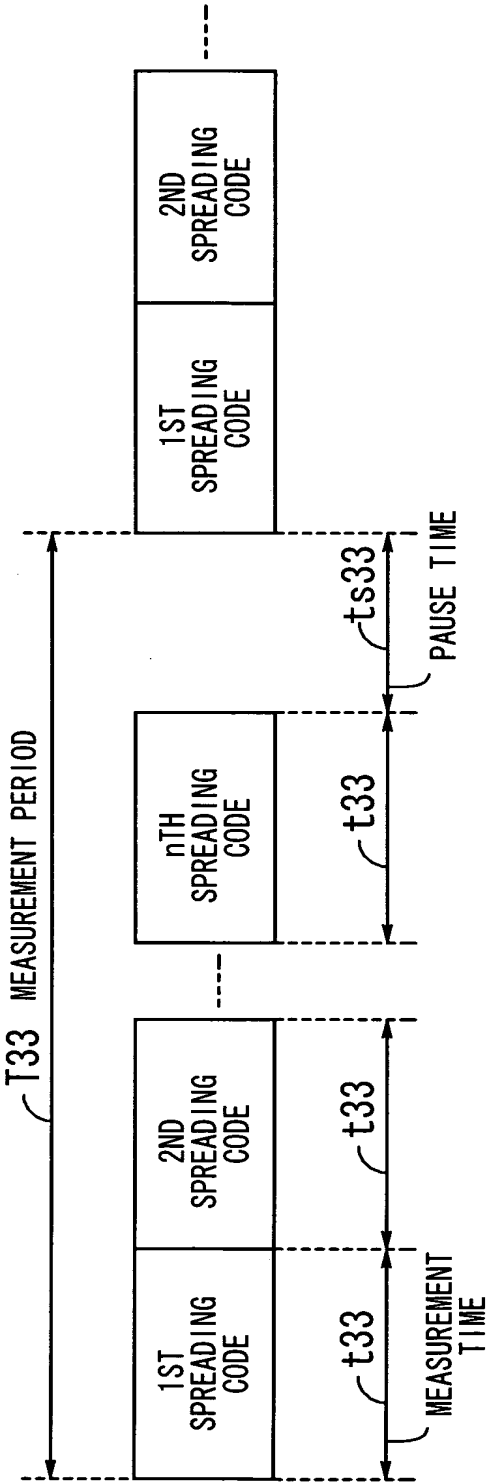AND MEASUREMENT TIME IS NOT CHANGED
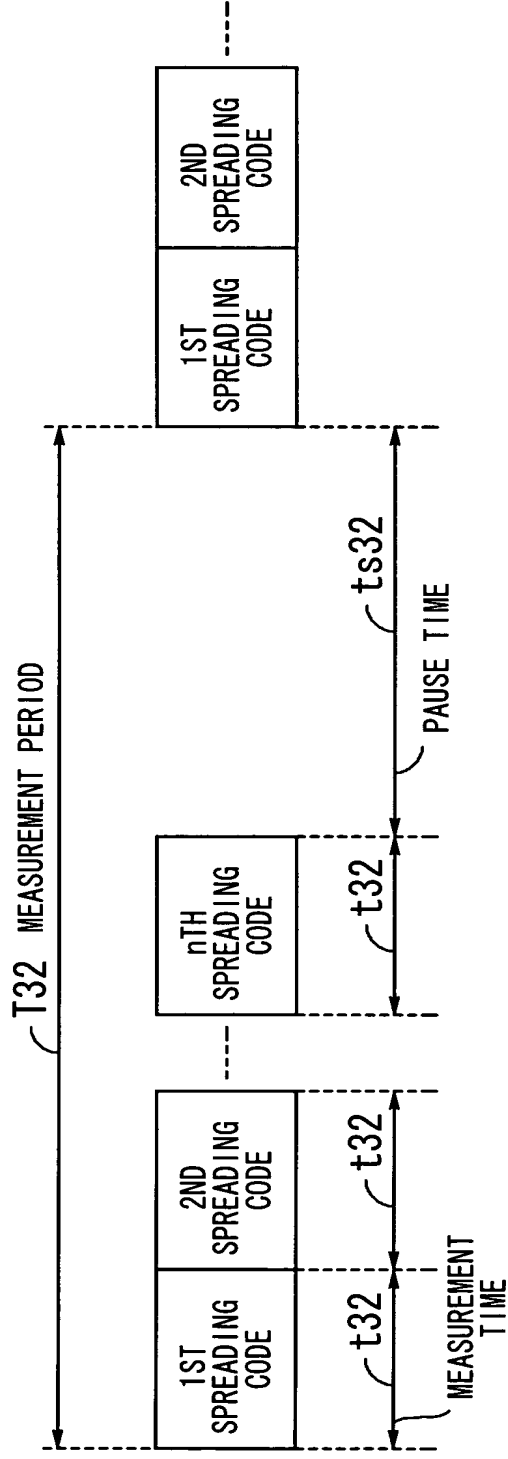
NUMBER OF SPREADING CODES=40

n=40

t32=2ms

T32=190ms

ts32=110ms

FIG. 30

STATE IN WHICH MEASUREMENT PERIOD IS INCREASED,
AND MEASUREMENT TIME IS CHANGED

1ST SPREADING CODE	2ND SPREADING CODE	...	nTH SPREADING CODE		1ST SPREADING CODE	2ND SPREADING CODE

T33 MEASUREMENT PERIOD

t33 | t33 | t33 | ts33

MEASUREMENT TIME

PAUSE TIME

NUMBER OF SPREADING CODES = 4 0

n = 4 0

t 3 3 = 4 m s

T 3 3 = 3 0 0 m s

t s 3 3 = 1 4 0 m s

F I G. 31

STATE IN WHICH MEASUREMENT PERIOD IS DECREASED,
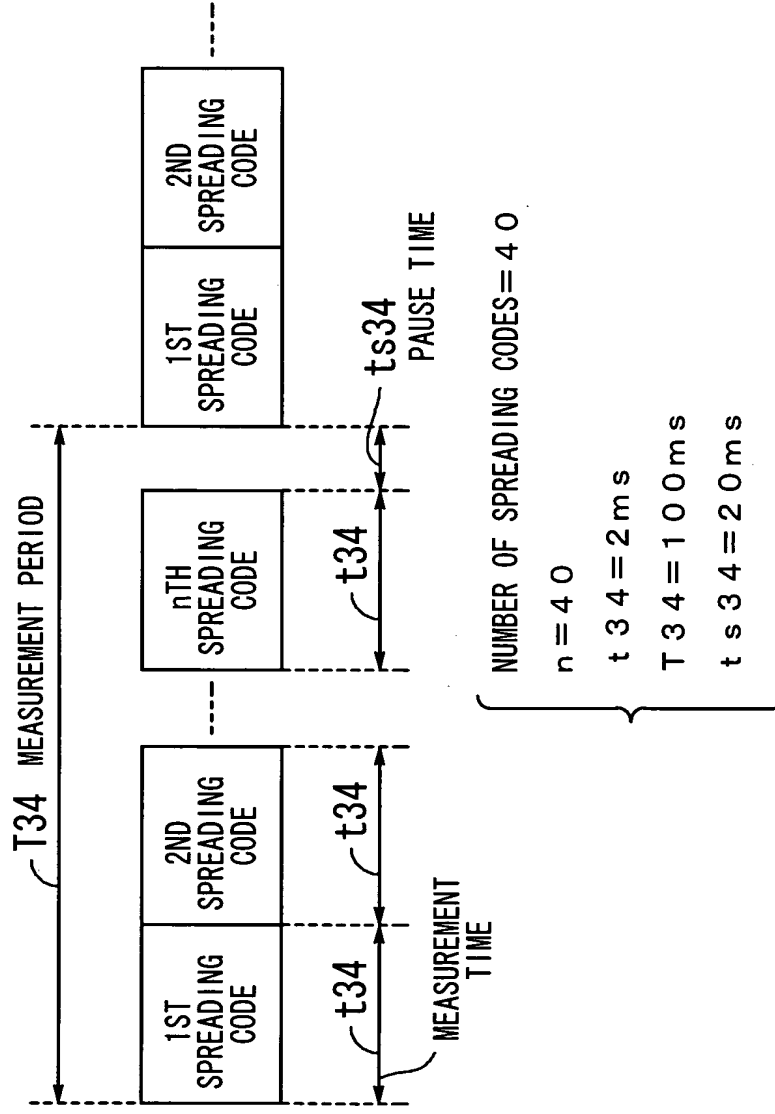AND MEASUREMENT TIME IS NOT CHANGED

1ST SPREADING CODE	2ND SPREADING CODE	-----	nTH SPREADING CODE		1ST SPREADING CODE	2ND SPREADING CODE

T34 MEASUREMENT PERIOD

t34   t34   t34   ts34
                                  PAUSE TIME

MEASUREMENT
TIME

NUMBER OF SPREADING CODES＝４０

n＝４０

ｔ３４＝２ｍｓ

Ｔ３４＝１００ｍｓ

ｔｓ３４＝２０ｍｓ

FIG. 32

STATE IN WHICH MEASUREMENT PERIOD IS DECREASED,
AND MEASUREMENT TIME IS CHANGED

| 1ST SPREADING CODE | 2ND SPREADING CODE | ⋯ | nTH SPREADING CODE | | 1ST SPREADING CODE | 2ND SPREADING CODE | ⋯ |

T35 MEASUREMENT PERIOD

$t35$ $t35$ $t35$ $t35$

MEASUREMENT TIME

PAUSE TIME

NUMBER OF SPREADING CODES＝４０

$n = 40$
$t35 = 1ms$
$T35 = 50ms$
$ts35 = 10ms$
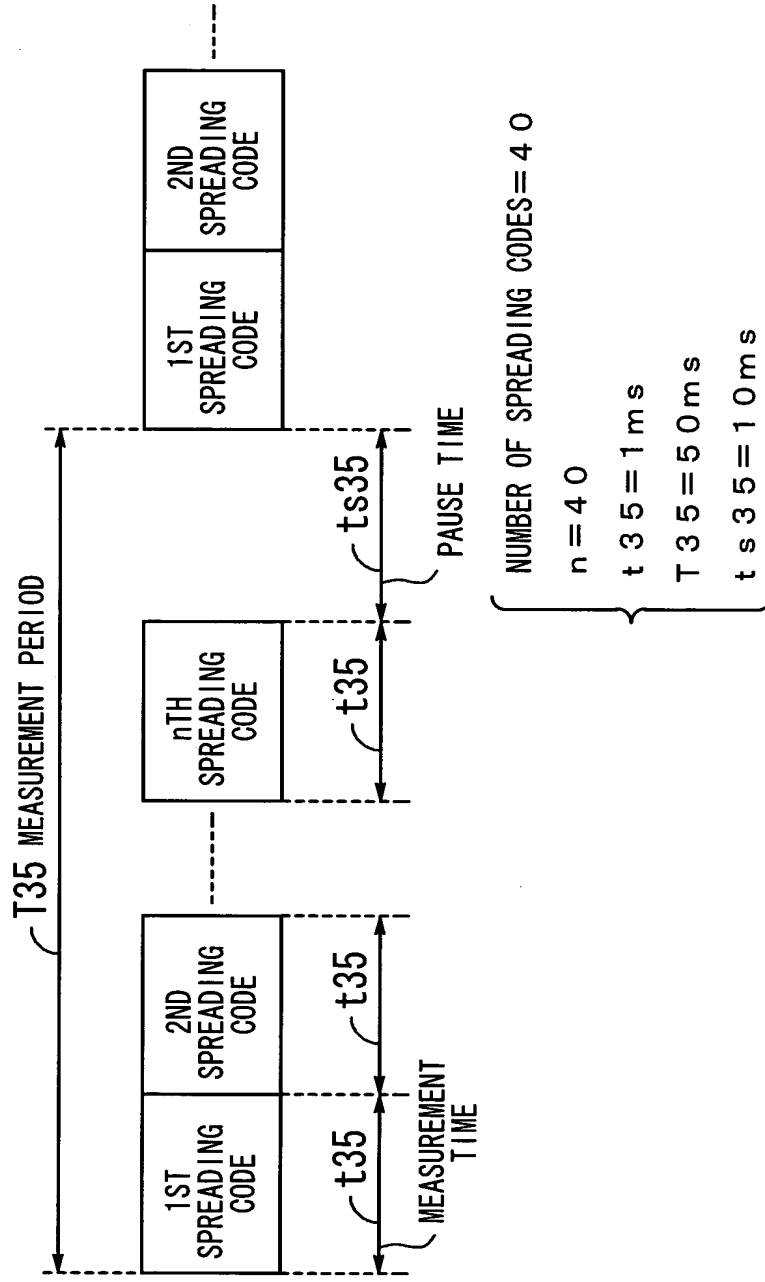
FIG. 33
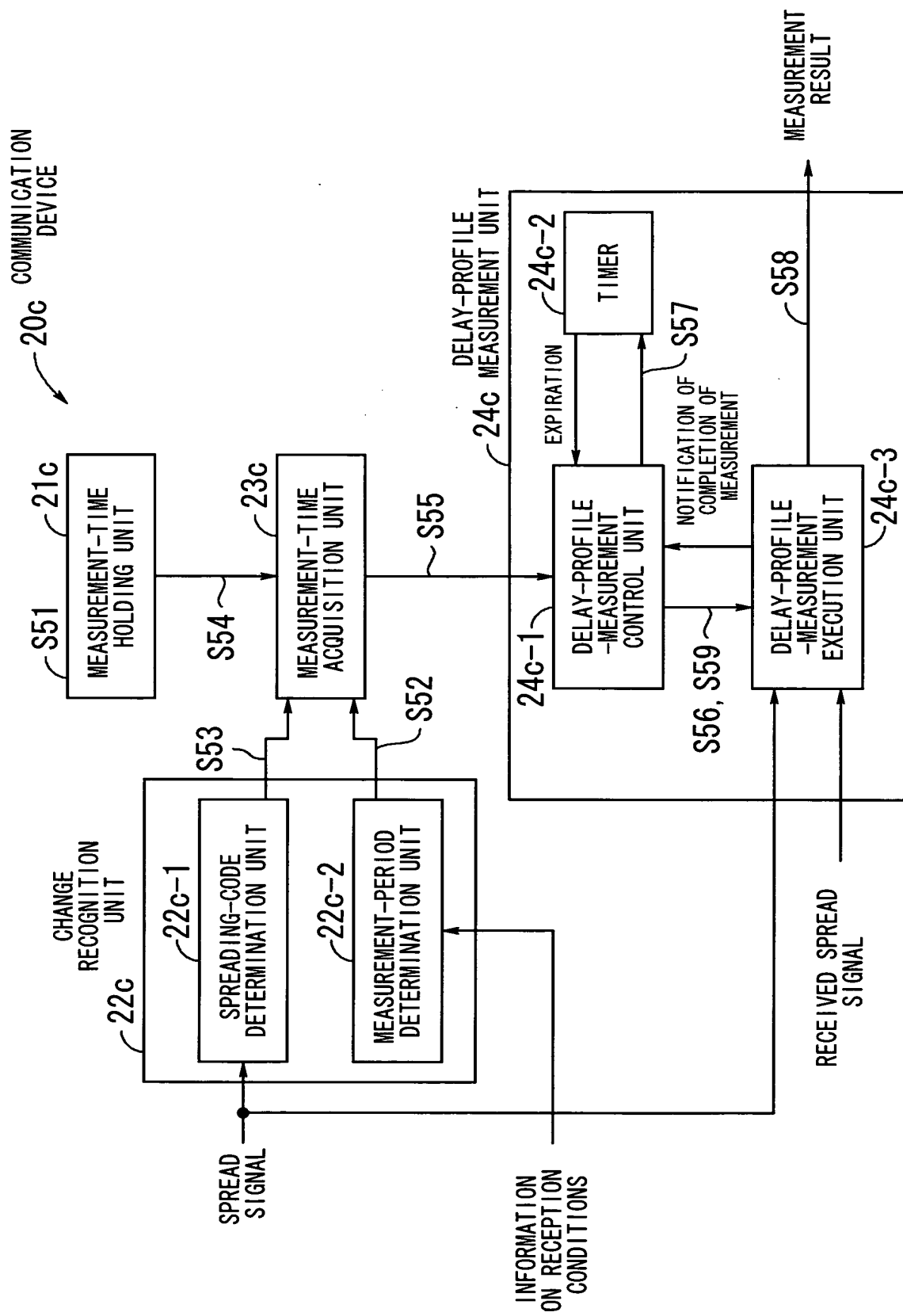
FIG. 34

21c-1

MEASUREMENT PERIOD \ NUMBER OF SPREADING CODE	1-16	17-32	33-48
50ms~	2ms	1ms	1ms
100ms~	4ms	2ms	2ms
200~400ms	4ms	4ms	4ms

MEASUREMENT TIME

FIG. 35

MEASUREMENT
WITH 2ND
SPREADING CODE

MEASUREMENT
WITH 1ST
SPREADING CODE

t_s
PAUSE TIME

MEASUREMENT
WITH nTH
SPREADING CODE

t

MEASUREMENT
WITH 2ND
SPREADING CODE

t

MEASUREMENT
WITH 1ST
SPREADING CODE

t
MEASUREMENT
TIME

T MEASUREMENT PERIOD

FIG. 36
PRIOR ART